

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE**

HEARING CHARTER

How Can Technologies Help Secure Our Borders?

**Wednesday, September 13, 2006
2:00 – 4:00 p.m.
2318 Rayburn House Office Building**

1. Purpose

On September 13, 2006, the House Science Committee will hold a hearing to examine how technology could be used to monitor the borders of the United States to deter illegal entry into the country and aid in apprehension of those crossing between legal points of entry.

2. Witnesses

Mr. Jay M. Cohen (RAdm., USN ret.) is the Under Secretary of Science and Technology at the Department of Homeland Security (DHS).

Mr. Gregory Giddens is the Director of the Secure Border Initiative Program Executive Office at DHS.

Dr. Gregory J. Pottie is the Associate Dean for Research and Physical Resources and a member of the Center for Embedded Network Sensors (funded in part by the National Science Foundation), Henry Samueli School of Engineering and Applied Science, UCLA.

Dr. Gervasio Prado is the President of Sentech, Inc. He is an expert in seismic and acoustic ground sensors.

Mr. G. Daniel Tyler heads the National Security Technology Division at the Johns Hopkins University Applied Physics Laboratory.

Dr. Peter R. Worch is an independent consultant, member of Air Force Science Advisory Board, and former Vice Commander of the Air Force's Rome Air Development Center (now Rome Laboratory).

3. Overarching Questions

- What technologies are currently being used at the borders? What are the strengths and weaknesses of these technologies? What technologies are currently available or in development that could improve security at the borders?

- How should the effectiveness of technologies be evaluated? How can the proper balance between deployment of technology and deployment of personnel be determined?
- What research is or should be underway to develop the next generation of border security technologies? How is DHS determining specific technology requirements, and how are these communicated to researchers and technology manufacturers?

4. Brief Overview

- The United States shares a border with Mexico that is over 2,000 miles long, and a border with Canada that is over 5,200 miles long. Both borders include remote stretches of land where unauthorized aliens can and do enter the United States.
- An array of technologies that are either currently available commercially, adaptable from military applications, or in development, could be deployed along the borders to enhance surveillance of human or vehicular traffic. Some experts suggest that an integrated system of advanced surveillance technologies, deployed along the borders with the necessary communications and information technology infrastructure, could provide more effective security in remote areas than would be provided by physical barriers.
- Impediments to deployment of border surveillance technologies include the cost of the technologies and their operation; the sensitivity of high-tech surveillance equipment to extreme temperatures and harsh environments; and the need to efficiently monitor, analyze, and respond to the potentially vast quantities of information generated by such equipment.
- On November 2, 2005, DHS announced the Secure Border Initiative (SBI), a multi-year plan to secure the Nation's borders through improvements in technology and increases in personnel. The fiscal year 2007 (FY07) budget request for SBI is \$639 million. Questions remain about how DHS will manage the technology selection and deployment process, as well as whether the DHS Science and Technology (S&T) Directorate is carrying out the appropriate programs to support the SBI and develop the next generation of border security technologies.
- Congress has become increasingly concerned that the S&T Directorate is not providing adequately technical support to the operational units of DHS or effectively engaging the scientific community and private sector in targeted research and development programs. As a result, both the House and Senate appropriators have proposed significant reductions in the S&T Directorate's funding for FY07.

5. Background

Most traffic across the borders of the United States occurs at formal, monitored points of entry. Between the official entry points, however, there are vast stretches of undeveloped and unpopulated land where drug trafficking occurs and unauthorized aliens can and do enter the United States; these remote stretches of land along the borders also provide an opportunity for terrorists to enter the country undetected. Advanced sensing and information technology can

assist in improving border surveillance and may constitute an effective alternative or supplement to physical barriers.

On November 2, 2005, DHS announced the Secure Border Initiative (SBI), a multi-year plan to secure the Nation's borders and reduce illegal immigration by installing state-of-the-art surveillance technologies along the border as well as by increasing the personnel dedicated to border security and alien detention and processing. A component of this plan is SBInet, a system to integrate the relevant technologies and personnel at the border. DHS plans to award a single large contract for this technology integration project by September 30, 2006. The FY07 budget request for SBInet was \$100 million, and current estimates suggest that the SBInet program will eventually cost approximately \$2.5 billion over five years. While the House and Senate FY07 appropriations bills allot DHS \$115 and \$132 million, respectively, to start on the SBInet, both bills require DHS to provide a strategic plan to Congress before most of the funding may be spent. Recent articles in The Washington Post and The New York Times describe concerns about whether the department is prepared to adequately manage the SBInet development and acquisition process and to effectively deploy and use the resulting technologies (see Appendices A and B).

Technologies for Border Security

The two main classes of surveillance technologies are ground sensors and aerial vehicles. Ground sensors are devices that can detect movement or traffic in areas near or at the borders. These may be buried underground or elevated on fixed poles. Examples of such sensors include magnetic sensors (which detect passing metal objects), seismic sensors (which detect land movement resulting from the passage of groups of people or vehicles), infrared sensors (which detect changes in heat patterns), and visual sensors (i.e. regular or night vision cameras). Radar systems mounted on towers may also be utilized to detect movement. The strengths of these sensors is that their ranges vary from tens of yards to upwards of several miles, they are "always on" without getting tired or hungry, and by designing their deployment strategically, the different types of data they supply can be integrated to provide information on the path or behavior of whatever traffic has been observed and reduce the likelihood of false alarms. Their potential weaknesses relate to the cost of the sensors and their operation, and the difficulty of operating technologies in remote terrain, such as the need to develop long-lasting power sources to support sensors and communication systems, and electronic hardware that does not break down in extreme heat or cold. Acquisition costs for ground sensors are thousands of dollars per sensor, and installing ground-based radar systems can cost hundreds of thousands of dollars.

Aerial vehicles equipped with a variety of sensors can be used to provide broad area surveillance over hundreds of miles. Examples include manned or unmanned aircraft and lighter than air platforms, including aerostats (which are tethered blimps) or airships (which hover at high altitudes). All of these platforms can carry sensor systems including visual cameras, radar systems, and electro-optical and infrared devices that use physical characteristics such as heat and movement to detect objects hidden from or too distant for visual inspection. The attraction of these aerial vehicles is that they can detect moving objects on the ground as well as capture images of recently traveled paths and thus can facilitate tracking suspicious motion in remote regions until Border Patrol agents can arrive to investigate. In addition, unmanned aerial

vehicles can spend a significantly longer period of time in the air than manned aircraft since they are independent of an on-board human operator. However, there are limitations to the use of unmanned aerial vehicles in civilian airspace, and it is likely to be at least three to eight years before the Federal Aviation Administration approves of the use of unmanned aerial vehicles in commercial airspace. For the FAA to approve the use of unmanned aerial vehicles in commercial airspace, the unmanned vehicles will have to demonstrate the same capability as a human pilot to detect and avoid other aircraft. Unmanned aerial vehicles cost millions of dollars. For example, the replacement cost of the Customs and Border Protection Predator B unmanned aerial vehicle that crashed in April 2006 is \$6.8 million.

A variety of ground sensors and aerial vehicles are available today from commercial sources and are in use at the borders and by the military. These systems can be used to start the SBInet program, but improved technologies and new technologies are likely to be needed for a fully effective system. Relevant research and development is ongoing at academic centers, military laboratories, and the private sector, and these programs should lead to technologies with more accurate detection, improved resolution, and reduced procurement and maintenance costs. One question is how DHS S&T can best support, guide and accelerate such research and development work.

Past Use of Technologies for Border Security

The security of the U.S. border is the responsibility of Customs and Border Protection, a unit of DHS that includes the Border Patrol and an air patrol unit. For many years, various forms of technology have been used at the border to support Border Patrol activities. For example, the Border Patrol has, since the early 1970s, placed sensors in remote areas to detect traffic by using ground sensors that detect movement and heat as well as video cameras and night vision cameras for surveillance. However, the DHS Office of the Inspector General (OIG) conducted a review¹ of remote surveillance technology acquisition programs managed by the Border Patrol, evaluating primarily the Integrated Surveillance Intelligence System established in 1998, and determined that the technology acquired could not be credited for increases in apprehensions, and it consumed significant staff time to monitor videos and investigate sensor alarms. The report, published in December 2005, also concluded:

- There was no integration of the technology components (i.e. if a camera was installed in the vicinity of a sensor, it had to be manually redirected so that a visual check could be done when motion was detected);
- The sensor systems were unable to differentiate false alarms due to weather changes or animal movement from incidents worth investigating;
- Efficient management of alarms and information was lacking (i.e. messages containing no information beyond that an alarm was triggered were sent to a remote office requiring agents to be dispatched to investigate the area); and
- Many sensors were not designed to withstand the stresses of the variations in terrain and weather conditions along the borders.

¹ Report OIG-0615, "A Review of Remote Surveillance Technology Along the U.S. Land Borders," Department of Homeland Security, Office of the Inspector General, December 2005.

In February, 2006, DHS testified before Congress on the agency's response to the OIG report.² DHS agreed with the concerns outlined in the report and noted that the Integrated Surveillance Intelligence System program had already been terminated (in 2004). DHS faulted the former Immigration and Naturalization Service and the General Services Administration for the poor management and oversight, lack of acquisition planning, and inadequate vendor competition noted by the OIG and stated that Customs and Border Protection had already taken steps to create a program management office with expertise in systems acquisition, contract management and oversight, and engineering to ensure that the administration of the SBI program would make more appropriate and effective decisions about technology acquisition, deployment, and use.

In addition to the Border Patrol's use of sensors on the ground, the air unit of Customs and Border Protection also conducts surveillance and interdiction of illegal activity using helicopters and small planes. These activities were supplemented by surveillance by unmanned aircraft with the assistance of the Department of Defense from June 2004 through January 2005. DHS then acquired a Predator B unmanned aircraft and deployed it along the southern border in September 2005. This aircraft crashed in April 2006, and the preliminary National Transportation Safety Board review implicates a procedural error made by the land-based pilot. DHS had already contracted to purchase a second Predator B prior to the crash of the first one and both the House and Senate Appropriations bills for fiscal year 2007 (FY07) include funding for acquisition of unmanned aerial vehicles.

In addition to ground sensors and aerial surveillance, the Border Patrol has also used fencing in certain locations as part of border traffic control efforts. In 1993, the Border Patrol completed a 14-mile fence along the San Diego sector border, and a more robust secondary fence replacement has been built along nine of the 14 miles since then. The effectiveness of the San Diego sector fence has been debated; proponents cite the drastic reduction in apprehensions in the years following its construction as evidence of its success, while opponents attribute the reduction to growth in Border Patrol personnel and increased local deployment of ground sensors. Outside factors such as economics and the job market may have also played a role. In addition, counting the number of apprehensions locally does not provide information about the displacement of illegal traffic to areas without a fence.³ Proponents continue to advocate for the construction of physical barriers. In the current Congress, the House and Senate immigration bills⁴ both authorize the Secretary of Homeland Security to build a fence over hundreds of miles along the southwest border. An amendment to fund the construction of 370 miles of fencing along the southern border at a cost of \$1.8 billion originally proposed to the Senate's FY07 Department of Homeland Security appropriations bill was defeated, however it was later adopted in the Senate FY07 Department of Defense appropriations bill.

² Testimony of Greg Giddens, Director, Secure Border Initiative Program Executive Office, DHS before the House Committee on Homeland Security, Subcommittee on Management, Integration, and Oversight, February 16, 2006.

³ Blas Nunez-Neto and Stephen Vina, "Border Security: Fences Along the U.S. International Border," CRS Report RS22026, January 11, 2006.

⁴ The immigration bills are H.R. 4437, *The Border Protection, Antiterrorism, and Illegal Immigration Control Act of 2005*, which passed the House on December 16, 2005, and S. 2611, *The Comprehensive Immigration Reform Act of 2006*, which passed the Senate on May 25, 2006.

Future Use of Technologies for Border Security

In determining what sensors to use, one critical issue is the capability of the sensors to function with minimal interruption in a variation of environments, including desert, forests, mountains, and waterways, with significant temperature and weather fluctuations. In remote areas, providing power to support both the sensors and the communications systems that transmit the sensor data is also a technical challenge.

A second critical issue is that the installation of large numbers of sensors, cameras, and other surveillance systems in the ground, on elevated platforms and on aerial vehicles will generate tremendous amounts of data. Computer systems can be used to manage the data, but it will be important to figure out where to deploy the sensors and how to link them together into a network so that information from different sensors can be compiled to provide a more complete picture of activities along the border. For example, installing infrared cameras and motion sensors in related positions can help Border Patrol distinguish between false alarms (say a passing coyote) and events worthy of further investigation and significantly reduce the dependence on personnel to look into alarms triggered by each sensor separately. Networked systems of sensors may also be used to collect data over a period of time and distance to allow agents or even computers to track a series of movements observed through several sensors being activated along the path of a group of people or a vehicle. Such data would assist in predicting where a Border Patrol agent could intercept the group most effectively. More advanced computer systems and networks could even take all of the information from the sensors and combine it with information about personnel and other infrastructure assets to provide a broad picture of activity along the border, which can be seen both by agents on patrol and central offices as needed in order to effectively manage responses and adjust agent deployments.

A third critical issue is how border security personnel will be deployed to make effective use of the sensor technologies and how to ensure that sensor information is displayed in a clear and usable fashion.

Computer models of the border security system developed with the support of DHS can help officials make decisions about what sensors to purchase and how to arrange them. Modeling is a mechanism to test system design to predict the effectiveness of different configurations of technology, forecast the personnel necessary to respond to incidents, and better understand the trade-offs between various options.

Research and development at universities, federal laboratories, and in the private sector is underway to produce the next generation of sensors and computer software that will improve sensor data analysis and interpretation. Nanotechnology is increasingly facilitating the miniaturization of sensors, allowing the creation of devices that can perform multiple sensor functions (i.e. combining movement and light detection). Sensors may be designed that can detect mobile communication devices such as radios and cell phones which are likely to be carried by smugglers. New computer analysis software programs are creating “smart” systems, such as sensors that can make adjustments based on data from nearby sensors, altering their sensitivity or orientation to focus on local activity and assist with differentiating background noise from real events, or computer programs that can “learn” from past experiences to properly

predict which activities require investigation by personnel. One of the great challenges is development of “automated scene understanding” programs, computer systems that can automatically analyze images and recognize certain types of activities, such as characteristic physical behavior of migrants crossing through remote areas. Such automated interpretation of the feeds from cameras could greatly reduce the time spent by people interpreting images and deciding if they merit investigation.

The Role of the DHS Science and Technology Directorate

The DHS Science and Technology Directorate (S&T) conducts research, development, testing, and evaluation of technologies to support the components of DHS, such as Customs and Border Protection. The funding levels within DHS S&T for border security activities are provided in Table 1.

Table 1: Funding for Border Security Activities within DHS S&T

Year	Funding Level (\$ in millions)
FY04	19.5 ⁵
FY05	14.5
FY06	14.7
FY07 (requested)	23.3 ⁶

DHS S&T has supported DHS border security operations beginning in FY04, when it participated in the analysis and selection of an unmanned aerial vehicle for acquisition by the Border Patrol. In FY05, S&T evaluated various commercially available sensors to determine how well they could distinguish between animal and human traffic and how well their power sources worked. S&T also supported the development of BorderNet, a pilot program to provide Border Patrol agents with mobile computers to compare names and fingerprints of apprehended individuals with a database while still in the field and to allow them to communicate with other agents and potential backup teams.

Currently, DHS S&T is contributing to the DHS-wide Secure Border Initiative by developing software that simulates the relationships and interdependencies among all personnel and assets at the border as well as immigration and customs enforcement infrastructure. This software is designed to allow the people making decisions about procurement and deployment of technologies to understand the trade-offs and possible unintended consequences of various changes in the broader border and immigration system, such as increased apprehensions requiring more detainment facilities and leading to backlogs in immigration court proceedings. In addition, DHS S&T is developing software that provides situational awareness to assist Border Patrol supervisors in tracking the location of agents and sensor activity on computer generated map displays to allow for efficient coordination of all possible resources in response to incidents or alarms.

⁵ FY04 appropriations included a one-time provision of \$4.0 million to support analysis of unmanned aerial vehicle capabilities in support of the Border Patrol’s potential acquisition.

⁶ The FY07 DHS appropriations bills do not allot specific funding levels for border security activities in DHS S&T.

Since DHS was created in 2003, the S&T Directorate has struggled with issues related to program execution, the setting of priorities, and the building of relationships with the potential users of technologies within DHS. Congress and outside observers have expressed concerns that the S&T Directorate does not provide sufficient help in evaluating technologies for DHS acquisition programs, is not moving quickly enough to assess and adopt potential new technologies proposed by the private sector, and does not have a clear way to determine priorities for long-term research investments.

Congressional concerns about ill-defined priorities, poor financial management systems, and staff turnover have affected DHS S&T's appropriations. In FY07, the House and Senate-passed appropriations levels are \$956 million and \$818 million, respectively; each is significantly below the request level (\$1002 million) and the FY06 appropriated funding for the current S&T programs (\$1153 million). Jay M. Cohen was sworn in as Under Secretary for Science and Technology on August 10, 2007. He filled a position which had been vacant since March 2006.

6. Questions for the Witnesses

Mr. Cohen and Mr. Giddens were asked to address the following questions in their testimony:

- What technologies are currently being used at the borders? What are the strengths and weaknesses of these technologies? What technologies are currently available or in development that could improve security at the borders?
- How is DHS making decisions about technology acquisition? How does DHS evaluate the effectiveness of technologies? How is the proper balance between deployment of technology and deployment of personnel determined?
- What research is underway to develop the next generation of border security technologies? How is DHS determining specific technology requirements and how are these communicated to researchers and technology manufacturers?

Dr. Pottie, Dr. Prado, Mr. Tyler, and Dr. Worch were asked to address the following questions in their testimony:

- What technologies are currently being used at the borders? What are the strengths and weaknesses of these technologies? What technologies are currently available or in development that could improve security at the borders?
- How should the effectiveness of technologies be evaluated? How can the proper balance between deployment of technology and deployment of personnel be determined?
- What research is or should be underway to develop the next generation of border security technologies? How is DHS communicating specific technology requirements to researchers and technology manufacturers?

Appendix A: Technology Has Uneven Record on Securing Border (Washington Post)

Washington Post, May 21, 2006

Technology Has Uneven Record on Securing Border

By Spencer S. Hsu and John Pomfret, Washington Post Staff Writers

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Applying lessons the U.S. military has learned in Afghanistan and Iraq, the Bush administration is embarking on a multibillion-dollar bid to help secure the U.S.-Mexican border with surveillance technology -- a strategy that veterans of conflicts abroad say will be more difficult than it appears.

One component of the Strategic Border Initiative provides the technological underpinning for the bold prediction by Homeland Security Secretary Michael Chertoff that the United States will gain control of the Mexican border and the Canadian border in as little as three years.

The plan envisions satellites, manned and unmanned aircraft, ground sensors and cameras tied to a computerized dispatch system that would alert Border Patrol units. "We are launching the most technologically advanced border security initiative in American history," President Bush said in his address to the nation Monday.

Skeptics contend that the Department of Homeland Security's record of applying technology is abysmal. Industry analysts say that an initial \$2 billion private-sector estimate is low. And by allowing the winning bidder to determine the technology and personnel needed to detect, catch, process and remove illegal immigrants, experts say, the plan ensures a big payday for contractors, whatever the outcome.

"If the military could seal a 6,000-mile border for \$2 billion, Iraq's borders would have been sealed two years ago," said Andrew F. Krepinevich Jr., executive director of the Center for Strategic and Budgetary Assessments, a defense think tank.

SBI-net, part of the border initiative, will dictate the government's long-term presence. Bush's push for a guest-worker program is grounded in the premise that conventional "enforcement alone will not do the job."

By reducing demand for immigrant labor, beefing up the Border Patrol and deploying next-generation technology to catch illegal border crossers, the administration plan "assumes operational control within . . . three to five years," Chertoff told Congress last month.

To supporters such as Sen. Judd Gregg (R-N.H.), chairman of the Senate subcommittee that funds homeland security, the Pentagon already possesses the necessary technology.

"It's complex, but it doesn't have to be invented. It hardly even has to be modified," Gregg said. "It's really just a question of will -- and dollars."

On the ground, early results of the government's multibillion-dollar wager to plug the porous border already are on display.

In far southwestern Arizona, U.S. Customs agents, the Border Patrol and the National Guard patrol 120 miles of forbidding desert from a communications room filled with computer workstations and lined with 25 flat-screen televisions on the wall.

The Border Patrol installed 25 fixed cameras over favored smuggling routes in the sector in recent years. More than 100 sensors lie buried in the ground. Seismic sensors alert at the movement of large numbers of people. Infrared sensors pick up heat signatures of people and objects, and magnetic sensors detect vehicles.

Agents also point to what they call the “skybox” -- a 25-square-foot room 30 feet above the border on a hydraulic jack, with top-of-the-line night-vision equipment. Agents say it’s claustrophobic but has one redeeming virtue -- air conditioning.

Overhead, the border agencies use blimps, unmanned aircraft, Black Hawk and Chinook helicopters and fixed-wing aircraft.

“We are starting to see substantial improvements,” said Chris Van Wagenen, a senior patrol agent assigned to Yuma, Ariz. “Now we've got sensors, cameras. We’ve doubled our manpower in a year, but we still need more.”

Bush has budgeted \$100 million this year for SBInet. But Chertoff’s department declined to estimate how much the three-to-six-year contract ultimately will cost. Industry analysts expect at least \$2 billion in spending -- and possibly much more over a longer period, based on the history of overruns in major Homeland Security technology programs.

By turning to contractors such as Boeing, Ericsson, Lockheed Martin, Northrop Grumman and Raytheon to design the workings of the system, SBInet also marks a government reliance on private-sector partners to carry out missions without a clear idea of what the network will look like, according to experts and immigration officials.

“SBInet represents a potential bonanza” for tens if not hundreds of companies, said John Slye, senior analyst of federal opportunities for Input, a Reston-based federal contracting consulting firm. The project is the most anticipated single civilian information technology contract since the Sept. 11, 2001, terrorist attacks, he said.

Skeptics in Congress cite a decade of frustration at the border.

Because of poor management, two failed border technology programs have cost taxpayers \$429 million since 1998, the Homeland Security inspector general reported in December. Nearly half of 489 remote video surveillance sites planned for the border in the past eight years were never installed. Sixty percent of sensor alerts are never investigated, 90 percent of the rest are false alarms and only 1 percent overall result in arrests.

A 10-year, \$10 billion system to automate border entry and exit data, US-VISIT, has yet to test security and privacy controls in its seventh year, congressional auditors reported.

Sen. Joseph I. Lieberman (Conn.), top Democrat on the homeland security committee, called the plan to solicit bids by May 30, pick a single winner and start to deploy by September “unrealistic” and filled with “too many questions.”

“How is ‘SBI’ not just another three-letter acronym for failure?” Harold Rogers (R-Ky.), chairman of the House appropriations subcommittee, asked at a hearing last month.

Chertoff deputy Michael P. Jackson said government is not the best judge of innovation in rapidly evolving technology and will benefit from the nimbleness of the private sector while conducting disciplined oversight.

“We are not buying a pig in a poke. . . . We don't have to buy everything they sell,” said Jackson, former head of a division at Lockheed Martin.

In Arizona, agents say cameras are mainly limited to populated areas because other parts of the border, where most illegal crossings occur, do not have electricity, and solar-powered cameras don't work. Sand, insects and moisture play havoc with the sensors, causing them to shut down or fire repeatedly. Agents and support staff are too busy to respond to each alarm.

On April 25, the Border Patrol's first and only Predator 2 unmanned aerial vehicle crashed outside Tubac, Ariz., just seven months after the \$6.5 million craft began its flights.

To military experts, the goal of erecting a “virtual fence” recalls attempts four decades ago to shut down the 1,700-square-mile area of the Ho Chi Minh Trail used to infiltrate South Vietnam, and more recently, to halt incursions along 1,200 miles of Iraq's border with Iran, Saudi Arabia and Syria.

“It's always harder than you think,” said Robert Martinage, Krepinevich's senior defense analyst. “The record is mixed.”

Technology has, of course, advanced rapidly over the decades. The Southwest's climate and foliage pose fewer challenges, and U.S. law enforcement has advantages of mobility, security and infrastructure on its side, said retired Air Force Maj. Gen. Glen D. Shaffer, a former director for intelligence for the Joint Chiefs of Staff.

Shaffer, now president and chief operating officer of dNovus RDI, a Texas firm that may bid on SBInet, said the project is reasonable but not foolproof. “Where the military historically has fallen short is putting all investments in sensors and not enough in the people that exploit the sensors. I would hope that DHS can get this right.”

But smugglers of drugs and immigrants also are highly adaptable and willing to escalate the border “arms race,” said Deborah W. Meyers, senior policy analyst at the Migration Policy Institute, a think tank.

“Coyotes” are regularly caught with night-vision goggles, military-issue binoculars, hand-held global positioning systems, and a treasure trove of cellphones and police scanners that allow them to listen to border agents.

Border Patrol agents said that smugglers dispatch scouts every five minutes to check enforcement through the border crossing at San Luis, due south of Yuma on the Mexican border.

“They even know the names of our drug dogs, and which are better at which drugs,” one agent said. “It’s unbelievable how much we are being watched.”

Officials say they don’t need to seal the borders. They just need to catch enough illegal border crossers to deter others from attempting the trip.

Robert C. Bonner, head of Customs and Border Protection from 2003 to 2005, said that at current staffing, the Border Patrol can handle only 10 percent of the illegal immigrant problem.

“But if you can reduce the flow even by half,” he said, “with moderate increases for Border Patrol and technology, we actually can control our border in a way we haven’t been able to in 20 or 30 years.”

Appendix B: Seeking to Control Borders, Bush Turns to Big Military Contractors (New York Times)

The New York Times, May 18, 2006

Seeking to Control Borders, Bush Turns to Big Military Contractors

By Eric Lipton

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The quick fix may involve sending in the National Guard. But to really patch up the broken border, President Bush is preparing to turn to a familiar administration partner: the nation's giant military contractors.

Lockheed Martin, Raytheon and Northrop Grumman, three of the largest, are among the companies that said they would submit bids within two weeks for a multibillion-dollar federal contract to build what the administration calls a "virtual fence" along the nation's land borders.

Using some of the same high-priced, high-tech tools these companies have already put to work in Iraq and Afghanistan -- like unmanned aerial vehicles, ground surveillance satellites and motion-detection video equipment -- the military contractors are zeroing in on the rivers, deserts, mountains and settled areas that separate Mexico and Canada from the United States.

It is a humbling acknowledgment that despite more than a decade of initiatives with macho-sounding names, like Operation Hold the Line in El Paso or Operation Gate Keeper in San Diego, the federal government has repeatedly failed on its own to gain control of the land borders.

Through its Secure Border Initiative, the Bush administration intends to not simply buy an amalgam of high-tech equipment to help it patrol the borders -- a tactic it has also already tried, at a cost of hundreds of millions of dollars, with extremely limited success. It is also asking the contractors to devise and build a whole new border strategy that ties together the personnel, technology and physical barriers.

"This is an unusual invitation," the deputy secretary of homeland security, Michael Jackson, told contractors this year at an industry briefing, just before the bidding period for this new contract started. "We're asking you to come back and tell us how to do our business."

The effort comes as the Senate voted Wednesday to add hundreds of miles of fencing along the border with Mexico. The measure would also prohibit illegal immigrants convicted of a felony or three misdemeanors from any chance at citizenship.

The high-tech plan being bid now has many skeptics, who say they have heard a similar refrain from the government before.

"We've been presented with expensive proposals for elaborate border technology that eventually have proven to be ineffective and wasteful," Representative Harold Rogers,

Republican of Kentucky, said at a hearing on the Secure Border Initiative program last month. "How is the S.B.I. not just another three-letter acronym for failure?"

President Bush, among others, said he was convinced that the government could get it right this time.

"We are launching the most technologically advanced border security initiative in American history," Mr. Bush said in his speech from the Oval Office on Monday.

Under the initiative, the Department of Homeland Security and its Customs and Border Protection division will still be charged with patrolling the 6,000 miles of land borders.

The equipment these Border Patrol agents use, how and when they are dispatched to spots along the border, where the agents assemble the captured immigrants, how they process them and transport them -- all these steps will now be scripted by the winning contractor, who could earn an estimated \$2 billion over the next three to six years on the Secure Border job.

More Border Patrol agents are part of the answer. The Bush administration has committed to increasing the force from 11,500 to about 18,500 by the time the president leaves office in 2008. But simply spreading this army of agents out evenly along the border or extending fences in and around urban areas is not sufficient, officials said.

"Boots on the ground is not really enough," Homeland Security Secretary Michael Chertoff said Tuesday at a news conference that followed Mr. Bush's announcement to send as many as 6,000 National Guard troops to the border.

The tools of modern warfare must be brought to bear. That means devices like the Tethered Aerostat Radar, a helium-filled airship made for the Air Force by Lockheed Martin that is twice the size of the Goodyear Blimp. Attached to the ground by a cable, the airship can hover overhead and automatically monitor any movement night or day. (One downside: it cannot operate in high winds.)

Northrop Grumman is considering offering its Global Hawk, an unmanned aerial vehicle with a wingspan nearly as wide as a Boeing 737, that can snoop on movement along the border from heights of up to 65,000 feet, said Bruce Walker, a company executive.

Closer to earth, Northrop might deploy a fleet of much smaller, unmanned planes that could be launched from a truck, flying perhaps just above a group of already detected immigrants so it would be harder for them to scatter into the brush and disappear.

Raytheon has a package of sensor and video equipment used to protect troops in Iraq that monitors an area and uses software to identify suspicious objects automatically, analyzing and highlighting them even before anyone is sent to respond.

These same companies have delivered these technologies to the Pentagon, sometimes with uneven results.

Each of these giant contractors -- Lockheed Martin alone employs 135,000 people and had \$37.2 billion in sales last year, including an estimated \$6 billion to the federal government -- is teaming up with dozens of smaller companies that will provide everything from the automated cameras to backup energy supplies that will to keep this equipment running in the desert.

The companies have studied every mile of border, drafting detection and apprehension strategies that vary depending on the terrain. In a city, for example, an immigrant can disappear into a crowd in seconds, while agents might have hours to apprehend a group walking through the desert, as long as they can track their movement.

If the system works, Border Patrol agents will know before they encounter a group of intruders approximately how many people have crossed, how fast they are moving and even if they might be armed.

Without such information, said Kevin Stevens, a Border Patrol official, "we send more people than we need to deal with a situation that wasn't a significant threat," or, in a worst case, "we send fewer people than we need to deal with a significant threat, and we find ourselves outnumbered and outgunned."

The government's track record in the last decade in trying to buy cutting-edge technology to monitor the border -- devices like video cameras, sensors and other tools that came at a cost of at least \$425 million -- is dismal.

Because of poor contract oversight, nearly half of video cameras ordered in the late 1990's did not work or were not installed. The ground sensors installed along the border frequently sounded alarms. But in 92 percent of the cases, they were sending out agents to respond to what turned out to be a passing wild animal, a train or other nuisances, according to a report late last year by the homeland security inspector general.

A more recent test with an unmanned aerial vehicle bought by the department got off to a similarly troubling start. The \$6.8 million device, which has been used in the last year to patrol a 300-mile stretch of the Arizona border at night, crashed last month.

With Secure Border, at least five so-called system integrators -- Lockheed, Raytheon and Northrop, as well as Boeing and Ericsson -- are expected to submit bids.

The winner, which is due to be selected before October, will not be given a specific dollar commitment. Instead, each package of equipment and management solutions the contractor offers will be evaluated and bought individually.

"We're not just going to say, 'Oh, this looks like some neat stuff, let's buy it and then put it on the border,' " Mr. Chertoff said at a news conference on Tuesday.

Skepticism persists. A total of \$101 million is already available for the program. But on Wednesday, when the House Appropriations Committee moved to approve the Homeland

Security Department's proposed \$32.1 billion budget for 2007, it proposed withholding \$25 million of \$115 million allocated next year for the Secure Border contracting effort until the administration better defined its plans.

"Unless the department can show us exactly what we're buying, we won't fund it," Representative Rogers said. "We will not fund programs with false expectations."

CORRECTION: A front-page article on Thursday about a federal plan to use contractors to help secure the borders of the United States misstated the amount that Lockheed Martin made in federal government sales in 2005. Of \$37.2 billion in sales, more than \$31 billion, not \$6 billion, was in sales to the government.

New Technology on the Border

The Department of Homeland Security will soon accept bids for a border control system that will use existing and new technologies in a single integrated information system. These five companies are expected to submit bids. Also shown are some existing technologies that could be involved.

	EMPLOYEES	2005 REVENUE (BILLIONS)
Boeing	153,000	\$54.8
Lockheed Martin	135,000	37.2
Northrop Grumman	125,000	36.7
Raytheon	80,000	21.9
Ericsson	56,000	20.3 *

Source: the companies



Northrop Grumman

▲ Northrop Grumman's Global Hawk is an unmanned surveillance plane.



Lockheed Martin

◀ Lockheed Martin's Tethered Aerostat Radar System hangs radar from an anchored balloon.

*Converted from
Swedish Krona

The New York Times